

Notice of Allowability

Application No.

10/674,845

Applicant(s)

MICKA ET AL.

Examiner

Art Unit

Shane M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment filed 9/21/2006.
2. ☒ The allowed claim(s) is/are 1,3-12,14-23, and 25-33 (renumbered 1-30).
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David Victor (Reg. No. 39,867) on 9/28/2006.

The claims 23 and 25-33 have been amended as follows:

23. A computer readable medium including code executed by a processor complex to form a consistency group of data, wherein the computer readable medium is implemented at a first storage site in communication with a second site, and wherein the code causes operations to be performed at the first storage site, the operations comprising:

receiving a command to form a consistency group with respect to data received at a first storage site that is mirrored to a second storage site;

providing a first data structure indicating updates to the first storage site not included in the consistency group that are received after the command;

providing a second data structure indicating updates to the first storage site in the consistency group to be formed;

transmitting a command to cause data copied to the second storage site that is part of the consistency group to be copied to a third storage site;

receiving indication when the data in the second storage site that is part of the

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consistency group is copied to the third storage site;

maintaining a flag indicating which of the first and second data structures to use to indicate updates received after the command to form the consistency group; and

toggling the flag to indicate the first or second data structure not currently indicated by the flag, wherein the flag identifies the first or second data structure that indicates updates to the first storage site not included in the consistency group.

25. The computer readable medium of claim 23, wherein the operations further comprise:

detecting a failure at the second storage site;

determining whether the data in the consistency group was copied to the third storage site; and

copying the updates at the first storage site indicated in the first data structure to the third storage site after determining that the data in the consistency group was copied to the third storage site.

26. The computer readable medium of claim 25, wherein the operations further comprise:

copying the data at the first storage site indicated in the first and second data structures to the third storage site after determining that the data in the consistency group was not copied to the third storage site.

27. The computer readable medium of claim 26, wherein the operations further comprise:

merging data indicated in the first and second data structures into either of the first or second data structure to indicate data in the consistency group that needs to be copied to the third storage site, wherein the other of the first or second data structure into which the data is not merged is used to indicate updates to data that is not in the consistency group.

28. The computer readable medium of claim 23, wherein the operations further comprise:

synchronously copying updates from the first storage site to the second storage site, wherein the first and second data structures indicate updates to the first storage site that were successfully synchronously copied to the second storage site.

29. The computer readable medium of claim 23, wherein the first and second storage sites are separated by a first distance and the second and third storage sites are separated by a second distance, wherein the second distance is substantially greater than the first distance.

30. A computer readable medium including code executed by a processor complex to form a consistency group of updates received at a first storage site, wherein the computer readable medium is implemented in a second storage site in communication with the first storage site, and wherein the code causes operations to be performed at the second storage site, the operations comprising:

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receiving at a second storage site updates from the first storage site;
providing a first data structure indicating updates at the second storage site to copy to a third storage site;
receiving a command to form a consistency group;
using a second data structure at the second storage site to indicate updates received from the first storage site after receiving the command that are not included in the consistency group to be formed; and
signaling the first storage site in response to copying the updates in the consistency group indicated in the first data structure to a third storage site.

31. The computer readable medium of claim 30, wherein the operations further comprise:

merging indications of updates in the first and second data structures into the first data structure in response to copying the updates in the consistency group indicated in the first data structure to the third storage site; and

indicating in the second data structure updates from the first storage site received after merging the first and second data structures.

32. The computer readable medium of claim 30, wherein the operations further comprise:

continuously asynchronously copying the updates indicated in the first data structure to the third storage site.

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33. The computer readable medium of claim 30, wherein the operations further comprise:
determining whether the second data structure is being used to indicate updates from the first storage site not in one consistency group in response to receiving the command to form the consistency group;

merging indications of updates in the first and second data structures in the first data structure in response to receiving the command to form the consistency group and determining that the second data structure is being used to indicate updates from the first storage site not in one consistency group; and

indicating in the second data structure updates from the first storage site received after merging the first and second data structures.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

Claims 1,3-12,14-23, and 25-33, are allowable over the prior art of record.

As per claims 1,12, and 23, the allowable subject matter of claims 2,13, and 24, have been amended into independent claims 1,12, and 23, respectively.

Claims 8,19, and 30, have been indicated as being allowable over the prior art of record as discussed in the previous Office action filed 6/23/2006.

Claims 3-7,9-11,14-18,20-22,25-29, and 31-33, are allowable as being dependent upon an allowable base claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane M. Thomas whose telephone number is (571) 272-4188. The examiner can normally be reached on M-F 8:30 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt M. Kim can be reached on (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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